Chapter 12: Things To Know

Section 12.1 Circle Review and Tangent Lines

| Objectives	Vocabulary
1. Review Circles and Arcs. 2. Use Properties of a Tangent Line to a Circle.	• tangent to a circle • point of tangency • tangent ray • tangent segment • common tangent • line of centers • tangent circles

In a plane, a _____ is the set of all points

equidistant from a given point called the _____.

P is the center of the circle.

$\overline{AB}$ is a diameter.

$\overline{PC}$ is a radius.

$\angle APC$ is a central angle.
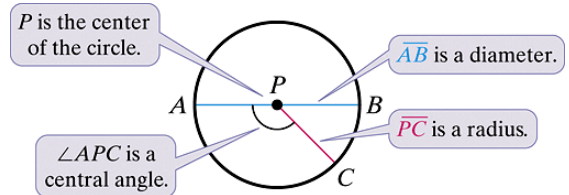
A _____ is a segment that contains the center of a circle and has both endpoints on the circle. The length of this segment is also called the diameter.

A _____ is a segment that has one endpoint at the center and the other endpoint on the circle. The length of this segment is also called the radius.

A _____ is an angle whose vertex is the center of the circle.
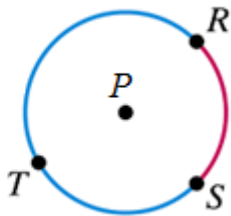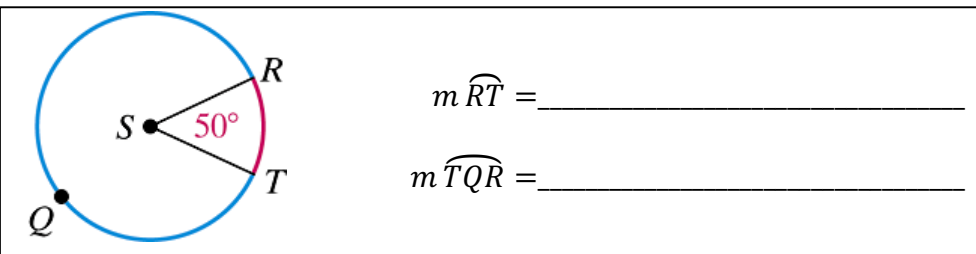
A _____ is half of a circle.

A _____ is smaller than a semicircle.

A _____ is larger than a semicircle.

In the picture above, _____ is a major arc and

_____ is a minor arc. Both of these arcs have

endpoints *R* and *S*, so be careful to name them correctly!

CAUTION! Canvas and some versions of PowerPoint do not display the arc symbol properly. In your notes, be sure to include the symbol.
e.g. $\overset{\frown}{RT}$, $\overset{\frown}{RST}$
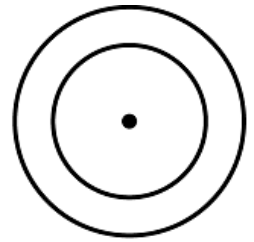
$m\,\overset{\frown}{RT} =$ _____

$m\,\overset{\frown}{TQR} =$ _____

The measure of a semicircle is _____.

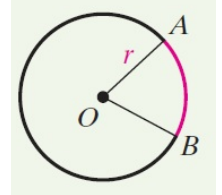Coplanar circles that have the same center are _____.

The measure of an arc is in degrees while the _____
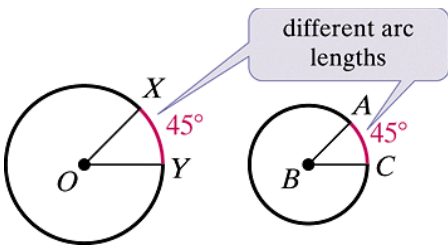is a fraction of a circle's circumference.

Theorem Arc Length
The length of an arc of a circle is
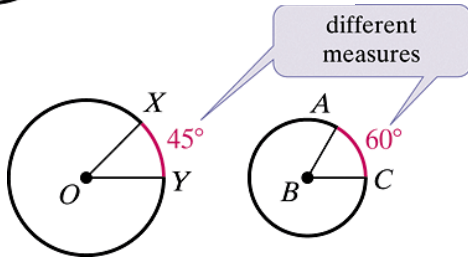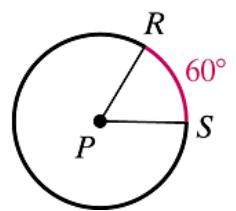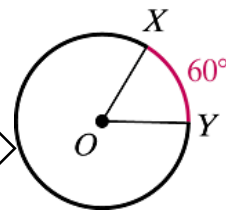
   length of $\widehat{AB}$ =

_____ are arcs that have the same
measure *and* are in the same circle or in congruent circles.

different arc
lengths

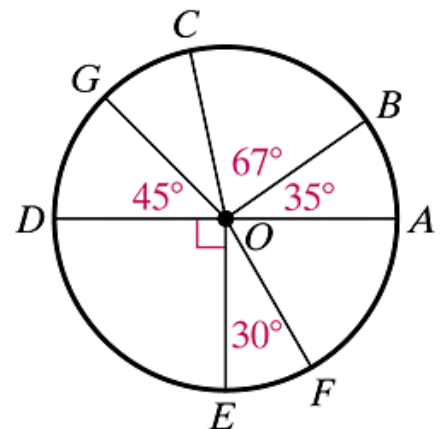$\odot O \cong \odot P$

$\widehat{XY} \cong \widehat{RS}$

- It is possible for two arcs of different circles to have the
  same measure but different lengths.

different
measures

- It is also possible for two arcs of different circles to have
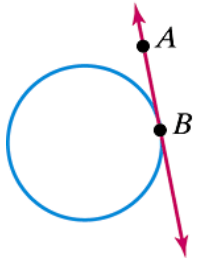 the same length but different measures.

In both of these cases, the arcs are **not congruent**.

Example Circles
Circle O has a radius of 18 m.

a. Find $m\,\widehat{BE}$.

b. Find $m\,\widehat{AED}$

c. Find the length of $\widehat{DEF}$.

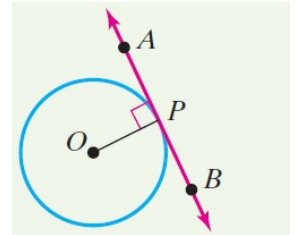A _____ to a circle is a line in the plane of the circle that intersects the circle in exactly one point.

The point where a circle and a tangent intersect is the _____
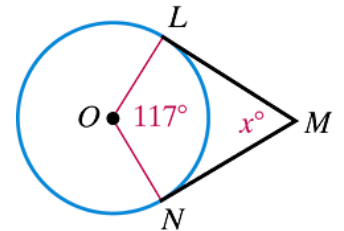
_____.

Theorem Tangent-Radius Theorem

If...

Then...

Example Finding Angle Measures
Multiple Choice $\overline{ML}$ and $\overline{MN}$ are tangent to circle O. What is the value of x?
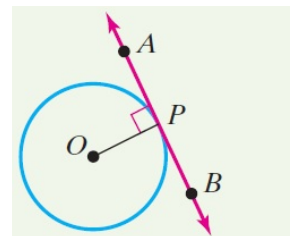
   a. 58   b. 63   c. 90   d. 117

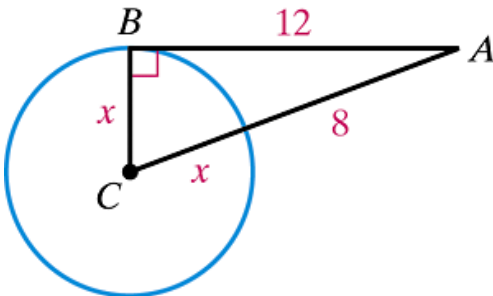**Theorem** Converse of Tangent-Radius Theorem

If...

Then...

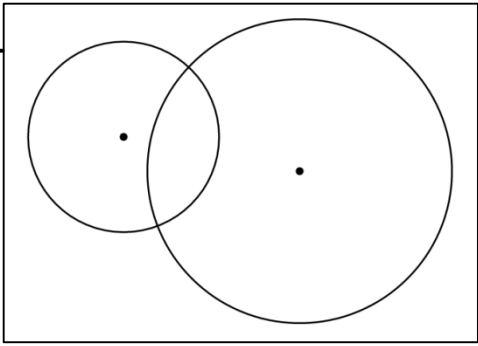
Example Finding a Radius
What is the radius of circle C?

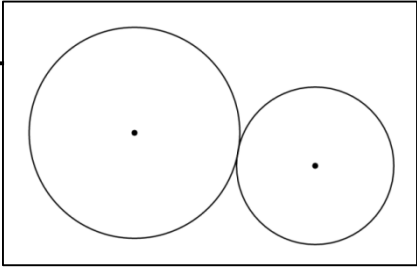Two circles in a plane can share a tangent line, called a _____.

Below, draw in all of the common tangents.

Possible Intersections of Two Circles:
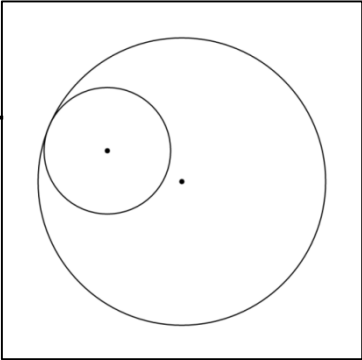
- Two Points of Intersection

    _____ external tangents

    _____ internal tangents
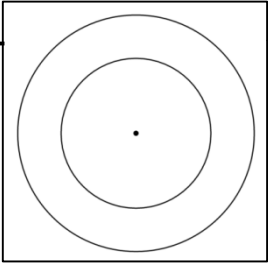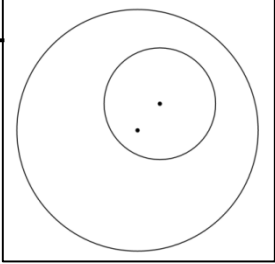
- One Point of Intersection

    _____ external tangents

    _____ internal tangents

- One Point of Intersection
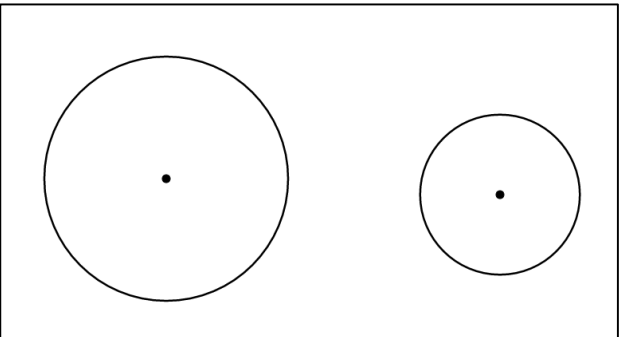
    _____ external tangents

    _____ internal tangents

- No Points of Intersection

    _____ external tangents

    _____ internal tangents

- No Points of Intersection
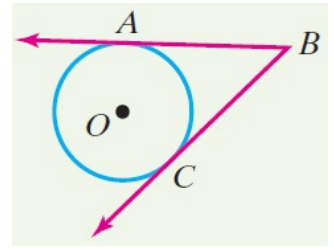
    _____ external tangents

    _____ internal tangents

The line that passes through the centers of two circles is called their _____.
If two circles are tangent to each other, then their point of tangency is on their line of centers.
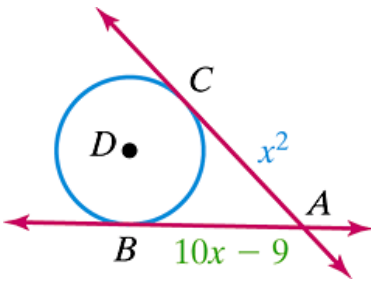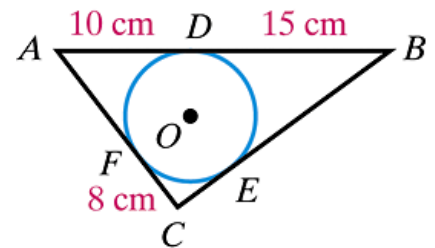
Theorem Congruent Tangent Segments

If...

Then...

Example Finding Tangent Segment Lengths
If $\overleftrightarrow{AC}$ and $\overrightarrow{AB}$ are tangents to circle D, find the value of x.

C

D•

x^2

A

B $10x - 9$

Example Circles Inscribed in Polygons
Circle O is inscribed in ΔABC. What is the perimeter of ΔABC?

10 cm D   15 cm

A   B

O

F

8 cm   E

C

Section 12.2 Chords and Arcs

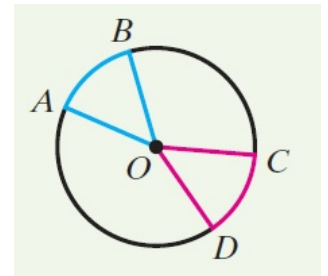| Objectives	Vocabulary
1. Use Congruent Chords, Arcs, and Central Angles. 2. Use Perpendicular Bisectors to Chords.	• chord
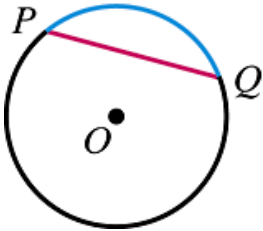
A _____ is a segment whose endpoints are on a circle.

Theorem Congruent Central Angles and Arcs
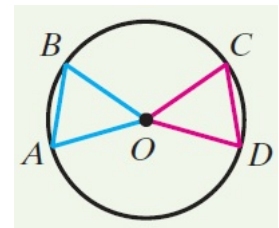Within a circle or in congruent circles,

•

and

•

Theorem Congruent Central Angles and Chords
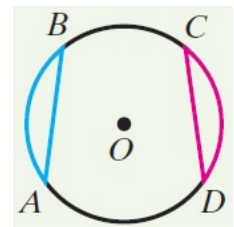Within a circle or in congruent circles,

•

and

•

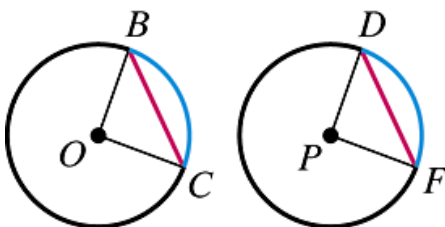**Theorem** Congruent Chords and Arcs
Within a circle or in congruent circles,

•

and

•

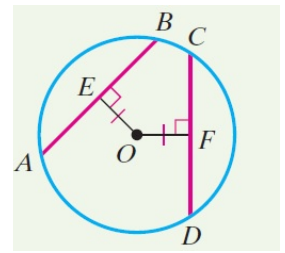**Example** Using Congruent Chords
In the diagram circle O is congruent to circle P. Given that $\overline{BC} \cong \overline{DF}$, what can you conclude?

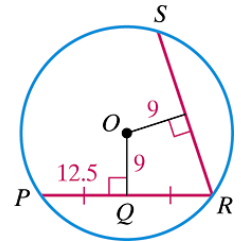**Theorem** Chords Equidistant from the Center are Congruent
Within a circle or in congruent circles,

-

    and
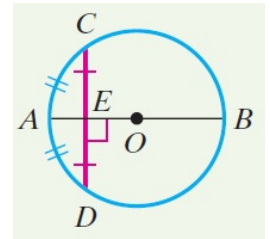
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Example Finding the Length of a Chord
What is the length of $\overline{RS}$ in circle O?

Theorem Chord and Arc Bisectors

If...

Then...

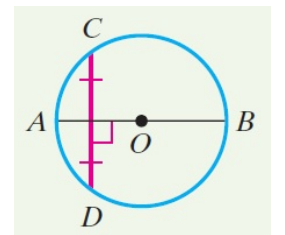**Theorem** Chord and Arc Bisector Converse

If...

Then...

Theorem The Perpendicular Bisector of a Chord Contains the Center

If...

Then...

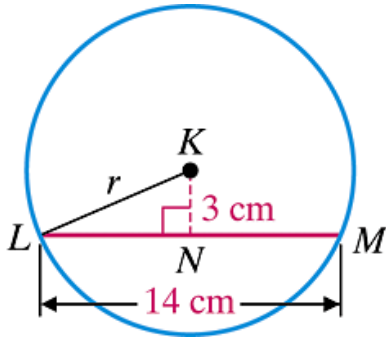**Example** Finding the Center of a Given Circle
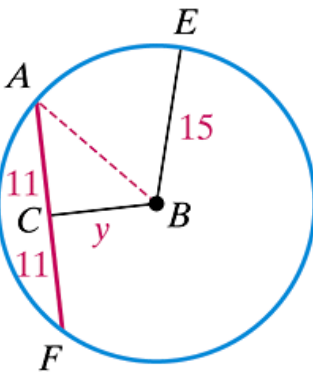Given a circle, describe how to find the center of the circle and the length of its radius.

Example Finding Measures in a Circle

What is the value of each variable to the nearest tenth?

a.

b.

Section 12.5 Coordinate Plane—Circles

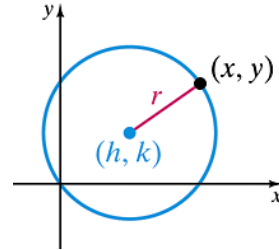| Objectives	Vocabulary
1. Write an Equation of a Circle. 2. Find the Center and Radius of a Circle Written in Standard Form.	• standard form of an equation of a circle

Theorem Equation of a Circle

An equation of a circle with center (h, k) and radius r is

Example Writing the Equation of a Circle

What is the standard equation of the circle with center $(5, -2)$ and radius 7?

Example Using the Center and a Point on a Circle

What is the standard equation of the circle with center $(1, -3)$ that passes through the point $(2,2)$?

Example Graphing a Circle Given its Equation

When we make a call on a cell phone, a tower receives and transmits the call. A way to monitor the range of a cell tower system is to use equations of circles. Suppose the equation $(x - 7)^2 + (y + 2)^2 = 64$ represents the position and the transmission range of a cell tower. What is the graph that shows the position and range of the tower?